DENTAL X-RAY UNIT

GE-100

Operation . Maintenance

Direction 13150

X-RAY DEPARTMENT
GENERAL ELECTRIC
MILWAUKEE 1, WISCONSIN

DENTAL X-RAY UNIT

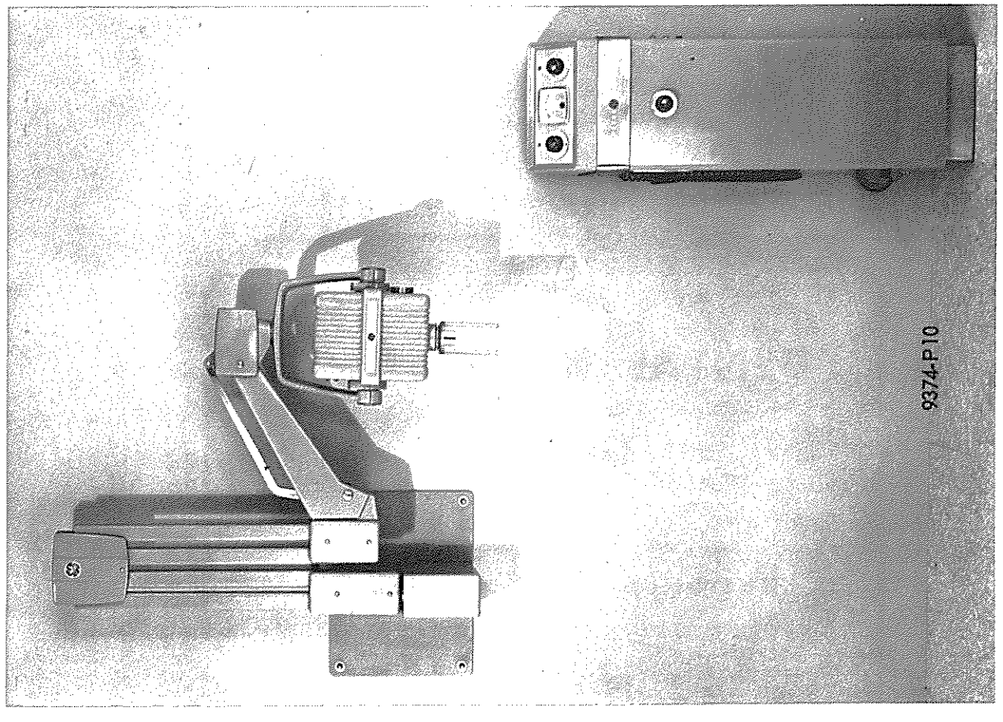
GE-100

Operation . Maintenance

Direction 13150

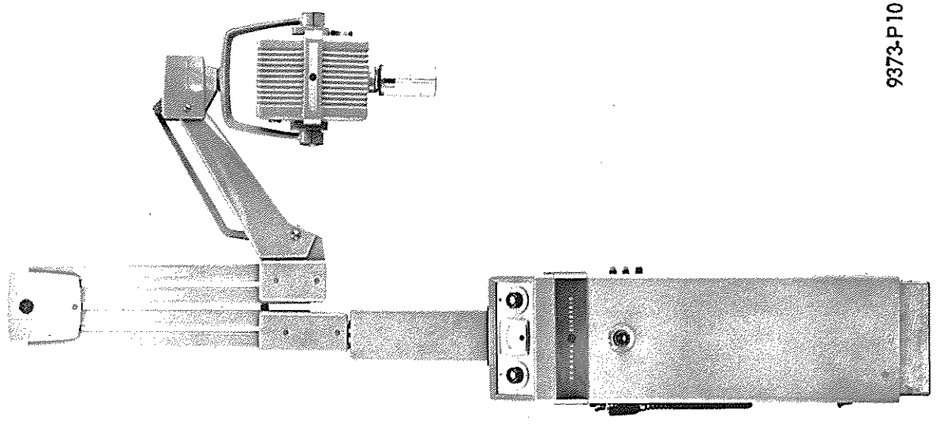
Code 11-165

X-RAY DEPARTMENT
GENERAL ELECTRIC
MILWAUKEE 1, WISCONSIN



9374-P10

GE-100 REMOTE FLOOR UNIT



9373-P10

GE-100 STATIONARY UNIT

IMPORTANT ... X-RAY PROTECTION

X-Ray equipment if not properly used, may cause injury. Accordingly the instructions herein contained should be thoroughly read and understood before you attempt to place this equipment in operation. The General Electric Company, X-Ray Department, will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus incorporates a high degree of protection against x-radiation other than the useful beam, no practical design of equipment can provide complete protection. Nor can any practical design compel the operator or his assistant to take adequate precautions or prevent the possibility of authorized or unauthorized persons carelessly, unwisely, or unknowingly exposing themselves or others to direct or secondary radiation.

It is important that everyone having anything to do with x-radiation be fully acquainted with the recommendations of the National Committee on Radiation Protection as published in the National Bureau of Standards Handbooks, of the American Standards Association, and of the International Commission on Radiation Protection, and take adequate steps to insure protection against injury.

It is assumed that all persons authorized to use the equipment are cognizant of the danger of excessive exposure to x-radiation and the equipment is sold with the understanding that the General Electric Company, X-Ray Department, its agents, and representatives have no responsibility for injury or damage which may result from exposure to x-radiation.

Various protective material and devices are available. It is urged that such materials or devices be used.

DENTAL X-RAY UNIT GE-100

FOREWORD

The GE-100 Dental X-ray Unit is of compact design providing simplicity in operation, yet retaining the flexibility required to produce dental radiographs of superior quality. It incorporates the latest features to assure exceptional radiographic results consistent with minimum X-ray exposure to the patient. The folding bracket and offset fork are designed for maximum flexibility and ease of operation. A single member distal arm and offset fork provide more than adequate clearance over the patient's head. The universal action in tubehead pivoting and rotation means complete flexibility. Both the tube head and folding bracket are counterpoised to glide smoothly and hold their position without locks or external friction devices.

There are only three X-ray controls – the Kvp control, Ma selector and Time Selector located on the control panel.

A description of the GE-100 and its operation are included in these instructions. A separate direction is furnished covering recommended radiographic exposure factors. To assure best results, read them before operating the unit and keep them readily available for reference.

DESCRIPTION

CONTROL UNIT

The control unit houses all the controls necessary for operation of the unit. A description of these and their function are presented below:

The **Line Switch & Ma Selector** are combined. To turn the unit on all that is necessary is to set the switch to the desired 10 or 15 MA position.

The **Pilot Lights** are located on the control panel. The Amber light will go on when the switch is

9375-P10

GE-100 REMOTE COMPACT UNIT

turned to the 10 or 15 MA position, indicating that the control is energized. The Red light will go on when the X-ray contactor coil is energized during the X-ray exposure.

The **Kvp Selector** is a continuously, variable autotransformer which is used to vary the kilovoltage applied to the X-ray tube from 40 to 100 kvp. The kilovoltage to which it is set is read on the Kvp Meter.

The **Kvp Meter** has two scales each calibrated in kvp values, the smallest division representing 2.5 kvp. The upper scale is to be read when the tube current selected is 15 ma and its range is from 40 to 90 kvp. The lower scale is for 10 ma operation and its range is from 50 to 100 kvp. During the exposure the meter reading drops to a lower value than before the exposure. The higher no-load reading is the kilovoltage applied to the X-ray tube.

The **Solid State Timer** controls the length of the X-ray exposure. Exposure time is determined by setting of the Time Selector dial on the control panel. The selector has 24 time positions ranging from 1/60 second to 5 seconds.

The Timer is completely electronic and its action is initiated by depressing the handswitch button. The Timer will automatically provide a start delay of approximately .45 second after the handswitch button is depressed to allow the X-ray tube filament to reach operating temperature, thus assuring full electron emission during the entire exposure. The Timer will automatically terminate the exposure after a time lapse as indicated on the time selector dial and will reset itself for the next exposure.

The **Handswitch** is a push-button microswitch enclosed in a bakelite case and provided with a coiled handswitch cable. When not in use the Handswitch is hung on the hanger on the side of the control panel.

The **Primary Fuse,** rated at 15 amperes, is located in the twist type fuse holder which is mounted on the Left Side of the control.* This fuse protects the unit from excessive current drain.

* On the Remote Compact Unit the fuse is in a fuse clip inside the control.

The **Stabilizer,** mounted in the control, maintains constant the selected tube current values of 10 or 15 MA through the X-ray tube in spite of instantaneous line-voltage variations.

The **Inverse Reducer,** mounted in the control unit, reduces the kilovoltage delivered by the high voltage transformer during the inverse half cycles of the alternating current wave to a value not greater than the useful kilovoltage. Its addition in the primary circuit makes it possible to operate a relatively small tube head at the full rating of the unit.

The **Surge Suppressor,** in the circuit of the X-ray contactor coil, causes the contactor to close just before the start of the useful half cycle of the alternating current wave. Starting the exposure before or at the zero point of the wave eliminates transient surges and high voltage stresses in the tube head and across the X-ray tube.

TUBE HEAD

The **Tube Head** contains a high voltage transformer, a filament transformer, and a Coolidge X-ray tube – all immersed in oil inside a steel tank. Immersion of the high voltage parts in oil, and absence of any exposed low-voltage connections, makes the tube head absolutely electrically safe, provided of course, that the unit is properly grounded.

The **Expansion Bellows** in the tube head compensates for expansion and contraction of the oil due to temperature changes caused by operation of the unit and room temperature variations. The ribbed type of tube head construction increases the surface exposed to air and promotes faster heat dissipation.

The **Offset Fork** can be rotated 360° around the vertical axis and the tube head which it supports can be rotated about 310° around the horizontal axis. The use of a commutator on the fork shaft permits quick removal of the tube head for servicing.

The **8" Open Cone** included with the GE-100 has a built-in scatterguard which eliminates 85% of the film fogging scatter found in conventional pointed cones. The result is increased diagnostic film detail and reduced exposure to the operator and the patient. The open cone has transparent walls and four guide lines to insure quick and accurate positioning.

Both 12" and 16" open cones with the built-in scatterguard are available optionally, as is the 8" pointed cone. All cones have built-in collimators which limit the primary X-ray beam to 2-3/4" at the cone end.

The **X-Ray Tube** has a projected focal-spot area of 1 mm assuring clear film detail. The tube is mounted inside a lead impregnated phenolic shield which absorbs x-radiation other than the primary beam. The built-in filtration of the primary beam is equivalent to 2.5 mm of aluminum. Two additional .5 mm filters, supplied with the unit may be inserted in the X-ray tube port.

FOLDING BRACKET

The **Folding Bracket** and offset fork provide 27" of useful horizontal travel when the 8" open cone is used. The one piece distal arm allows 21" of vertical travel.

Smooth and positive positioning of the tube head for all radiographic positions is assured by a unique design which employs a counterbalanced combination of various types of bearings and counterbalance springs.

RATING

The GE-100 has X-ray tube current selections of 10 milliamperes (50 to 100 Kvp), and 15 milliamperes (40 to 90 Kvp). At the 10 Ma, 100 Kvp rating the X-ray tube can accept one single exposure of 5 seconds. At the 15 Ma, 90 Kvp rating, the X-ray tube can accept one single exposure of 3 seconds maximum.

The combined duty cycle of the X-ray tube and the tube head is TWO 2-second exposures per minute continuously.

OPERATION

The GE-100 is very simple to operate and there are but a few operative steps. For best results, however, it is essential that these steps be thoroughly understood and followed.

Before operating the unit certain basic procedures should have been completed. These include positioning of the patient's head, aligning the tube head to the patient, and any other preparatory steps that may be necessary. Operation of the X-ray unit

is simple and summarized below in step-by-step form.

1. Turn the Line Switch–MA Selector to either 10 or 15 MA.
2. Adjust the KVP Control for the desired kilovoltage as indicated on the KVP meter. Read the top scale if tube current is set for 15 MA and the bottom scale if set for 10 MA.
3. Set the Time Selector to the desired exposure time. If the Line Switch – MA Selector is set at 15 Ma, do not select a time in excess of 3 seconds unless the Kvp is set at 85 or below.
4. Select the proper tube head if the unit is equipped with a Remote Tube Head Selector Switch.
5. Depress and hold down the handswitch button. Release the button when the exposure is completed as indicated by the second audible click of the X-ray contactor or when the exposure light is extinguished.
6. Repeat above steps as required for additional exposures.
7. Turn the Line Switch–MA Selector to OFF.

A more detailed description of the operating procedure is as follows:

1. Turn the Line Switch–MA Selector to either 10 or 15 MA. When this is done the Amber light on the control panel will light and there will be a deflection on the panel voltmeter indicating that the control is energized. The position of the switch will also determine the value of X-ray tube current (10 or 15 MA) during the exposure.
2. Adjust the KVP Control for the desired kilovoltage. The KVP meter will indicate the actual kilovoltage impressed across the X-ray tube during the exposure. The upper scale is to be read when the tube current selected is 15 MA. The lower scale is for 10 MA operation. Since the X-ray tube current will be held constant (at 10 or 15 MA) by the stabilizer a trial exposure at the kilovoltage selected is not necessary.
3. Set the Time Selector to the desired exposure time. If the Line Switch–MA Selector is set at 15 MA, do not select a time in excess of 3 seconds unless the Kvp is set at 85 or below.
4. Select the proper tube head if the unit is equipped with a Remote Tube Head Selector Switch. Select position 1 if only one Remote Tube Head has been installed.
5. Depress and hold down the handswitch button to start the exposure. Release the button when the exposure is completed. The electronic timer will automatically delay the start of the exposure for approximately .45 second after depressing the handswitch button. This is to enable the X-ray tube filament to reach operating temperature. An audible click of the X-ray contactor, or energizing of the exposure light, will indicate the start of the exposure and will be followed by a second audible click of the contactor (exposure light extinguished) indicating termination of the exposure.
6. Since Solid State timer will automatically reset itself, additional exposures can be made by merely repeating step 5. Of course, if a different exposure time, KVP or X-ray tube current is desired, it will be necessary to reset the respective controls as indicated in steps 1, 2 & 3, above.
7. After completing the radiographic examination of the patient turn the Line Switch–MA Selector to OFF. This will disconnect the X-ray unit from the power source.

MAINTENANCE

The GE-100 requires little routine maintenance other than periodic cleaning of the external parts. Use a clean, dry cloth which may be moistened slightly with light machine oil.

Occasional maintenance problems which may arise should be handled by a representative of the authorized dental dealer.

CAUTION: Only properly trained and qualified personnel should be permitted access to the internal parts.

RADIOGRAPHIC TECHNIC

Radiographic Technics for the GE-100 Dental Unit are covered in a separate direction furnished with the unit. Recommended radiographic data is in chart form so that it can be made easily available for ready reference.

WARRANTY

General Electric Company warrants that new x-ray and electromedical apparatus sold by it to the Purchaser shall be free from defects in material or workmanship for a period of twelve months from the date of original installation, and no other warranties, except of title, shall be implied. New x-ray tubes and kenotrons, if any, incorporated in or supplied with said apparatus are not warranted hereunder but are covered by the Company's standard tube and kenotron warranty applicable thereto in effect on the date of sale. No warranties either expressed or implied shall apply to glassware or batteries.

If any defect in material or workmanship appears in new apparatus within the period of time specified above, the Purchaser shall notify the Company immediately through the Dental Dealer from whom purchased and the Company shall thereupon correct the defect by repairing the defective part or by supplying a replacement thereof at the Company's expense. The conditions of any test shall be mutually agreed upon and the Company shall be notified of, and may be represented at all tests that may be made. The liability of the Company, except as to title, arising out of the supplying of said apparatus, or its use, whether on warranties, or otherwise, shall be limited to the correction of defects as aforesaid, and upon the expiration of said warranty period all such liability shall terminate. In no event shall the Company be liable for consequential or special damages. The foregoing shall constitute the sole remedy of the Purchaser.